NOTE XXIX.

ON THE VARIABILITY OF CHARACTERS IN PERICHAETIDAE

BY

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Every one occupied with the study of Perichaetidae, no doubt will be persuaded, that too much species of this genus are based on a single specimen, that showed some slight differences from well-known type-species, whether by its being not quite mature, or by the variability of some of its organs. In a recent paper Michaelsen [1]) as well as Benham [2]) especially called attention to this fact and urged the necessity of examining as many individuals of a species as possible, to augment our knowledge of the variability of the characters of these worms and of their value for the discrimination of the species. Whether Michaelsen is right in uniting so many species of Perichaeta, as done by him in his paper, above referred to, I hope to discuss later on; for I think Benham rightly says: »until we know more of the variability of the animals we are justified in regarding a given position as fixed, if any considerable number of specimens reveal it." In the present paper I wish to point out for a couple of them the variability of some characters always used in differentiating *Perichaeta*-species, viz. the number of spermathecae, and the number and arrangement of copulatory papillae.

1) Oligochaeten in Kükenthal's Ergebn. einer Zoolog. Forschungsreise in den Molukken und Borneo; Abhandl. Senckenb. naturf. Gesellsch. Bd. XXIII, 1896, p. 208.

2) Journ. Linnean Society, Zoology, vol. XXVI, p. 221.

Perichaeta biserialis Perrier.

(— *monocystis* Bedd.).

Some years ago my friend Dr. Th. Lens, Surgeon of our West-India army, kindly forwarded me a bottle with earthworms, collected in Paramaribo. Among them there are several examples, which must be identified with *P. biserialis* Perr. [1]), though this species hitherto is not observed in South-America, and only mentioned from the distant isles of Madagascar and the Philippines. Like several other earthworms this species therefore appears to have a very wide distribution, probably due to man's interference. According to the investigations of Perrier [2]), Beddard [3]) and Michaelsen [4]) *P. biserialis* is distinguished by the following characters: chaetal ring on a prominent ridge, presenting a ventral gap, on each side of which there is an enlarged bristle, forming thus behind the girdle an apparent longitudinal row of setae on the left and the right of the ventral median line; upon the segments in front of the girdle, except the anterior ones, two or three setae on each side are thus enlarged. The male generative pores situated on prominent, conical papillae upon segment XVIII and the 3 to 7 succeeding segments each with a pair of copulatory papillae in positions nearly corresponding with them. First dorsal pore in the intersegmental groove XII/XIII. The fifth, sixth and seventh septum are specially thickened; for Beddard's assertion that they should lie one segment more posteriorly I think to be erroneous. Two pairs of spermathecae, opening into the intersegmental grooves V/VI and VI/VII, consisting of a globular main pouch, with short excretory duct and a tubular diverticulum, extending over 2/3 of its length.

1) The collection contained also *P. posthuma* Vaill., *P. Houlleti* Perr., *Pontosc. corethrurus* Fr. Müll. and a *Benhamia* sp.

2) Compt. Rendus de l'Acad. des Sc. LXXXI, 1875. p. 1043.

3) Proc. Zool. Soc. 1890, p. 63, pl. IV, fig. 7.

4) Abhandl. Senckenb. naturf. Gesellsch. Bd. XXI, 1897, p. 226.

Prostata large, occupying segments XVI—XIX, flat, reniform, with U-shaped duct. Intestinal coeca not present in segment XXVI.

The two specimens examined by Beddard and first identified by himself with *P. biserialis*, afterwards were described as belonging to a new species, on account of the absence of spermathecae; however, I cannot agree with his assertion, as will appear from the following.

Perrier, who in 1875 first described *P. biserialis* from the Philippines, already pointed out the variability of the number of copulatory papillae in this species; he says »on peut en effet constituer une série d'individus présentant, en arrière des orifices mâles, de chaque côté de la ligne médiane ventrale, une rangée de trois, quatre, cinq, six ou sept papilles. Quelques individus ont même trois, quatre ou cinq papilles d'un côté, quatre, cinq ou six papilles de l'autre." In 1890 Beddard examined two specimens from Manilla, both characterized by the presence of 5 pairs of copulatory papillae. In the foregoing year Michaelsen published a detailed description of the same species, based on the examination of five individuals, collected in Madagascar. He confirmed the variability of the number of copulatory papillae, for of these specimens four showed but 3 pairs of papillae, while the fifth one had 5 pairs of them.

My own observations about the worms from Surinam are quite in agreement herewith. Eight mature worms came under examination and of these two have 4 pairs of copulatory papillae on segments XIX—XXII; three of them show only 3 pairs on segments XIX—XXI; one specimen has 3 papillae on segments XIX—XXI at the right side, and on segments XX—XXII at the left, while on both remaining worms one has only 3 papillae at the right, the other one at the left side of the body on segments XIX—XXI. None of them thus showed the number of 5 pairs of papillae, as observed by the above-named naturalists.

In our specimens, however, the variability is not

limited to the number of papillae; they also show remarkable differences in the number of spermathecae. Only in a single specimen two pairs of spermathecae were observed in segments VI and VII; they agree rather well with Michaelsen's description, though I found the main pouch more pear-shaped than globular and the diverticulum only extending till the half of its length in stead of two thirds. Considering however that the shape and size of this pouch depends somewhat on the state of being more or less filled, I think no much value can be ascribed to those differences. Of the seven remaining worms one specimen (with 4 pairs of papillae) only shows a single spermathecal pore at the left side in the intersegmental groove V/VI, corresponding with a spermatheca without diverticulum in segment VI; another specimen (also with 4 pairs of papillae) has three spermathecal pores in a row in the same situation. Comparing the spermathecae of the last individual with those of the first one, the main pouch proves to be somewhat more slender and the diverticulum does not extend quite till the half of its length. In the fourth specimen also at one side (the right) spermathecal pores are visible, 4 in the intersegmental groove V/VI and 3 in that between segments VI and VII. On the contrary in four other specimens no trace whatever of spermathecal pores or spermathecae could be found; they agree in this character with both individuals examined by Beddard, and represent, I think, his species *P. acystis*.

As Benham already suggested, that in this species the spermathecae might perhaps be not yet functional and therefore extremely minute like in some specimens of *Lumbricus herculeus* with fully-developed sperm-sacs and clitellum, I made transverse sections of one of our worms, but no trace of spermathecae was visible.

Also the arrangement of the setae showed some irregularity in a couple of worms. Ordinarily the distance between both enlarged ventral bristles measures four times the usual distance; on some segments, however, it can amount

till five or six times that distance, and thereby the continuity of the series of large setae is also broken off. In the number of setae our worms agree very well with Michaelsen's statement; I found on segment X 83 bristles, while he mentions 81 on segment V and 90 on segment X. The length of the enlarged setae is two and a half to three times that of the ordinary ones; at their distal extremity they are ornamented with obvious transverse grooves.

Similar variations in the number of spermathecae were already observed by Beddard some years ago in a lot of worms from Manilla belonging to *P. posthuma* [1]); besides normal specimens with four pairs of spermathecae, he found one individual with three pairs of them, another one with no trace whatever of spermathecae, while in one specimen there were in segment VIII on the right hand three spermathecae in a row, instead of a single.

Perichaeta Stelleri Mich.

(*P. Everetti* Bedd., *P. papillata* Bedd., *P. sarawacensis* Bedd., *P. kinabaluensis* Bedd.).

In 1891 Michaelsen described a remarkable *Perichaeta*-species [2]) from the Sangi-isles, distinguished by the fact that it possesses numerous (16—28) spermathecae in segments VI and VII, furnished with diverticula, which are swollen at their base. The male pores situated on very prominent papillae on segment XVIII; moreover a pair of copulatory papillae on the three succeeding segments XIX—XXI. First dorsal pore in the intersegmental groove XII/XIII. Setae in a nearly continuous ring, on a prominent ridge; fifty-six in the middle of the body. The 5th—8th and 11th—14th septa specially thickened. Intestinal coeca absent.

Four years afterwards Beddard described in his Monograph of *Oligochaeta*, four new species from Borneo quite allied to *P. Stelleri*: of those *P. Everetti* is also char-

1) Ann. a. Mag. of Nat. History, Ser. 5, vol. XVII, 1886, p. 93.
2) Jahrb. Hamb. Wissensch. Anstalten, VIII, p. 39.

acterized by the presence of three pairs of papillae on segments XIX—XXI, but has 12 and 17 spermathecae respectively in segments VI and VII; *P. papillata* with ten pairs of papillae on the segments XIX—XXVIII and 7 spermathecae in segments VI and VII; *P. sarawacensis* with four pairs of papillae on the segments XIX—XXII, and 14 spermathecae in segments VI and VII; *P. kinabaluensis*, having on segments XIX and XX a single median papilla, like those of *Everetti* fused, on segment XXI the left half only developed and in segments VI and VII, 11 and 17 spermathecae in each. In Kükenthal's Ergebnisse einer zoologischen Forschungsreise Michaelsen describes another badly preserved specimen of *P. Stelleri* from Borneo, with 5 and 9 spermathecae in segments VI and VII respectively, and he makes the suggestion that the above-named species of Beddard all could be identified with his *P. Stelleri*. I think Michaelsen's suggestion quite right, for the number of papillae and spermathecae, characterizing Beddard's different species appear not to be constant, but liable to much variation.

I had the opportunity to examine a great number of Perichaeta-specimens, collected by Dr. Büttikofer in Western-Borneo (Poetoes Sibau, Nanga raoen, the Liang Koeboeng); they agree with each other externally in the presence of a pair of papillae on several segments behind the male pores, internally in the presence of more than one pair of spermathecae in segments VI and VII, and the absence of intestinal coeca. They all I believe must be identified with *P. Stelleri* and are characterized in the following manner.

The length of their body varies from 115 to 300 mm.; the number of segments amounts to 150. The colour is is olive-brown, violet on the upper side, often with a dark line in the dorsal mid-line; chaetal circles whitish. Cephalic lobe extending over two-thirds of the buccal segment, which is longitudinally folded. Setae on a prominent ring in front of the clitellum, with obvious dorsal

gap; 54 of them on segment VI, 68 on segment XIX. The ventral setae are straighter and longer than the dorsal ones. No setae on clitellum. First dorsal pore in the intersegmental groove XII/XIII. Several small spermathecal pores in a transverse row, in the grooves between segments V and VI, VI and VII. Oviducal pore single, on an oval area upon segment XIV. Male pores, on prominent conical papillae, formed by a longitudinal crescent fissure with crenulated lateral margin. In the interspace between the male pores 12 to 14 setae; their number is somewhat variable, and depends on the development of the papilla.

The number of pairs of copulatory papillae on the succeeding segments is different in several individuals. In most of them there are four pairs of papillae on segments XIX—XXII; but this number can increase to eleven pairs and decrease to a single one.

On comparing the number of papillae of different individuals they will prove to form an almost uninterrupted series, as demonstrated by the following table:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*
	mm.								
Length:	240	300	290	300	?	115	150	105	160
XIX. . . .	..	..	..	..	..	..	..	..	..
XX	..	..	.	..	..	..	..	..	
XXI. . . .	..	..	.	..	..	..	..		
XXII . . .	..	..	.	..	..	..			
XXIII. . .	..	..	.	..	.				
XXIV. . .	..	..	.	..					
XXV . . .	..	..	.						
XXVI. . .	..	..	..						
XXVII . .	..	..	..						
XXVIII. .	..	.							
XXIX. . .	..								

The first specimen (*a*) is characterized by the presence of 11 pairs of papillae on segments XIX—XXIX; a second specimen (*b*) however possesses 9 pairs on segments XIX—

XXVII and a single papilla on segment XXVIII at the right ventral side, so we may conclude that of the tenth pair the left one is not developed. In a third specimen (*c*) we find 9 papillae at the left and 3 at the right ventral side, forming a complete pair only on segments XIX, XXVI and XXVII, while on the interposed segments (XX—XXV) the right papilla is not developed. Next follows an interruption in the series, for specimens with 7 and 8 pairs have not been observed by myself, but an individual (*d*) collected on the Liang Koeboeng showed 6 pairs on segments XIX—XXIV. Another specimen (*e*) presents 4 pairs of papillae on segments XIX—XXII and a single one, at the right side, on segment XXIII; it is likely that of the last pair the left papilla was not developed. In another individual there are no papillae on the anterior segments XIX and XX, but segments XXI and XXII show a pair of them and segments XXIII a single one; it may be presumed that in this specimen both anterior pairs of papillae and one of the last pair are checked in their development. Specimens with 4 pairs of papillae on segments XIX—XXII, like *f*, are very common; even in immature individuals, without clitellum; these papillae are recognizable. A specimen, that has only two pairs of papillae on segments XXI and XXII, but wants those on the two preceding ones, belongs to the same category. In the worms from Nanga raoen there are but 3 pairs of papillae visible on segments XIX—XXI (*g*). A few specimens (*h*) have only 2 pairs of papillae on segments XIX and XX; and in one individual (*i*) only a single pair of them on segment XIX is present. The papillae have a transverse oval shape and are situated just in front of the circle of setae, which sometimes are pushed from their place [1]).

The spermathecae lie in segments VI and VII; in most specimens there are more than one pair in each segment,

1) For an account of their structure, as also for more details of the internal anatomy, see my paper „on the earthworms of the Dutch Scientific Expedition to central Borneo."

and usually the number of them at the right side is not the same as that at the left. The largest number, observed in segment VI, was 29: at the right side 17, at the left 12; it was in a worm from Sintang, with only a single pair of papillae. In a couple of specimens I found only two spermathecae in this segment, one on each side. In segment VII the number of spermathecae usually is larger than in the preceding; in one specimen I observed 30 of them, 15 at the right and 15 at the left side. The smallest number I met with was 3 on each side. It is not always in the largest specimens that the greatest number of spermathecae is to be found. A specimen, 300 mm. long, showed a single pair of them in segment VI, while in segment VII there were 12, at the right side 7, at the left 5; on the contrary one individual, 115 mm. in length, had in segment VI five spermathecae, 3 at the right and 2 at the left, while the following segment showed 5 pairs of them.

Leyden Museum, November 1898.